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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



MARCH 20, 1937

Let's See That Shadow!

See Page 184

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The Weekly



Summary of

Current Science

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Edited by WATSON DAVIS

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DO YOU KNOW?

Three medium-sized apples weigh about a pound.

If a child studies lessons at a shiny table, a large blotter on the table will protect his eyes from glare.

British workers in many branches of the chemical industry are required to wear special protective clothing.

An Indian game similar to pitching horseshoes consisted in tossing rocks at a hole, keeping score on the best shots.

The United States Indian Service is using radio for the first time in its history, to give the public a series of talks on Indians, past and present.

Grizzly bears run fast; Yellowstone park rangers tell of bears racing automobiles at speeds of 28, 30, and possibly even 35 miles an hour.

By the Sea of Azov, Russian archaeologists have unearthed remains of Frangoria, a Greek colonial city that sank into quicksands 2,500 years ago.

Two government plant explorers have brought back from the Tigris and Euphrates Valleys about 3,500 samples of seed and bulbs to be tested for American use.

An Angora rabbit may yield as much as 20 ounces of wool in a year.

Boric acid will control certain diseases in fruit trees, such as drought spot and corky core in apples.

Of the 65 divisions of the U.S. Patent Office, 12 are chemical or have something to do with chemical arts.

A copper coin weighing seven and one-half pounds is a rare relic of Swedish money used over 200 years ago.

Museum workers dislike hearing animal exhibits called "stuffed," since modern taxidermy is so unlike old-fashioned stuffing of skins.

A new can-opener, designed for large cans of paint and oils, trims off the top of the can and rolls back the sharp edges into a safety rim.

In tests of four crops that are commonly irrigated, scientists in Nebraska learned that alfalfa and sugar beets are thirstier plants than oats and potatoes.

Since the first lion was imported into Leipzig, Germany, in 1877, the Zoological Gardens there have specialized in breeding lions, and 1,000 cubs have been born.

WITH THE SCIENCES THIS WEEK

Most articles are based on communications to Science Service or papers before meetings, but where published sources are used they are referred to in the article.

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ZOOLOGY

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MICROPHOTOGRAPHY

Microfilms Hailed as New Way To Duplicate Books, Pictures

New Technique Makes Library Stores More Accessible; Permits Distribution of Unpublished Manuscripts

By WATSON DAVIS

A NEW way of duplicating records, manuscripts, books and illustrations is being developed and scientists predict that it is destined to play a large part in the scholarly research of the future.

It consists of making miniature photographs on film and then reading them by use of a machine that enlarges them to more than original size on a translucent screen.

"Microfilms," these small photographs of documents and books are called. Soon, it is predicted, this word will be as common as "book" or "journal" in library, educational and scientific circles.

These microfilms are made on ordinary motion picture film. A hundred feet of microfilm, small enough to slip into the vestpocket, will hold 1,600 pages of a book or manuscript, or more than the contents of five ordinary fat books.

Science Service, the institution for the popularization of science, has inaugurated and sponsored this development with the cooperation of the Chemical Foundation, the U. S. Naval Medical School, the U. S. Department of Agriculture Library, the U. S. Bureau of the Census, the Library of Congress, the Works Progress Administration and other agencies.

This new technique is called "microphotography," not to be confused with "photomicrography," which is the making of large photographs of very small objects through a microscope.

Need Special Apparatus

While it has many problems in common with ordinary photography, with so-called candid cameras, motion picture apparatus, etc., microphotography requires special apparatus. Design and construction of required cameras and reading machines has been accomplished under the direction of Dr. R. H. Draeger, a U. S. Navy surgeon, detailed to cooperate in this project for making scientific litera-

ture more accessible at low expense.

Science Service and its cooperating agencies have demonstrated that microfilms are practically useful in two important fields:

Two Fields

1. Making material in libraries more accessible by allowing the librarian in effect to loan the book and keep it on the shelves, too.

2. Publishing voluminous, technical, or highly illustrated manuscripts, theses, and other material that now languish in laboratories and studies because no journal has funds or space to publish them.

As a demonstration and practical service the "bibliofilm service" has been

operated in the Library of the U. S. Department of Agriculture for the past two and one-half years. During that time hundreds of thousands of pages of material have been microfilmed for research workers, at the cost of about a cent a page. This bibliofilm service has been acclaimed by research men and women in all corners of the globe who are thus enabled to use the facilities of this important library hitherto inaccessible to them.

Leading Journals Aid

The editors of more than 25 leading scientific journals are cooperating with Science Service in an auxiliary publication service made possible by microfilm. Articles, tables of data, illustrations and other material that can not be published are deposited with Science Service, where a document number is assigned and a price is set for which a microfilm copy can be furnished. The journal then publishes a short version of the scientific paper together with an announcement of the availability of the microfilm. Readers who need it then order it sent them. In this way important but specialized material can be made perpetually accessible without burdening li-



READING THE FILM

The tiny images on microfilm are enlarged with optical apparatus to make them easily read. This reading machine can be placed on a desk like a typewriter and projects the images on a translucent screen so that they are larger than the original size of the type.



HANDY VIEWER

For film inspection or for use when traveling is this small sized viewing device.

braries and individuals with material that they may never need.

A reading machine that stands conveniently on the desk and can be loaded in a few seconds with thousands of pages of microfilm has been perfected. In the future those engaged in scholarly research will think of a microfilm reading machine as they do of a typewriter, and studies, libraries and laboratories will be equipped with them as commonly as with typewriters.

Records of all sorts, as well as scholarly materials, will be condensed and preserved by microfilming. An ordinary letter-sized sheet of 8½ by 11 inches shrinks to three-quarters by one inch upon a microfilm. This is only 1/125 of the original area.

Safety Film Used

Because non-inflammable cellulose acetate or "safety" film is used in making microfilm, copying upon it is actually an act of preservation. The National Bureau of Standards has concluded that microfilms will last as long as good rag paper, which means at the least one to two hundred years.

One valuable use for microfilm is for copying newspapers, rare documents, archives and other material that will otherwise soon be lost to civilization. The Library of Congress was a pioneer in using the microfilm method for copying historical documents in Europe, the originals of which may be endangered or destroyed as in Spain. Some newspapers are now having microfilms made of their daily issues as a method of preservation for libraries. Newsprint

only 20 years old is disintegrating badly in some cases.

As a result of Science Service's pioneering in applying microfilms to scholarly material, scientific and scholarly organizations are organizing a Documentation Institute to continue and broaden the work that has been done.

It is not considered likely that microfilms will ever replace ordinary books, magazines or newspapers produced in large editions. The economy and usefulness of microfilm lie in making available a small number of copies of material of limited appeal or in reducing the bulk of voluminous works.

Not content with the possibilities already demonstrated, it is planned to apply microfilm in the future to the problem of making a giant index of all scientific literature. Heretofore scientists have not dared to contemplate such an undertaking because of the millions of cards that would need to be classified and filed, to say nothing of the cost of printing. If an "electric eye" were perfected to select from the rolls of microfilm the references a scientist might desire, then the building and use of such a great guide to the world's knowledge might be contemplated.

Smaller Still

The present microfilm, condensed as it is, is not considered the ultimate. With better photographic emulsions, which may already be in the making in laboratories, it should be possible to make the photographic images still smaller. If the microfilm images can be made a quarter-inch high instead of one inch, that is, if the reduction ratio can be made 44 instead of 11, then upon a film the size of the familiar three by five inch card used universally in libraries, there could be placed 240 pages.

What does this mean? The libraries of the future may be placed in the space of their present card catalogs.

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ANTHROPOLOGY

Jungle Life Blamed for Ancient Man's Flat Head

JUNGLE life was to blame for prehistoric people in Java having ape-like flatness of head, 25,000 years ago.

This is the theory of Dr. G. H. R. von Koenigswald, who has arrived from Bandoeng, Java, bringing with him eleven casts of the skulls of men, women, and children of this strange-looking ancient race. Their heads became flat at the back, he believes, because they developed tremendous neck muscles in their athletic struggles to weave their way through thick Javanese jungles.

Solo Man

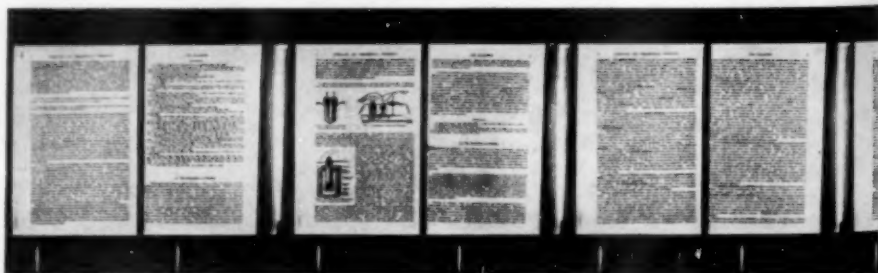
This early human type has been discovered in Java, and named Solo Man, after the Javanese river where the bones came to light. Dr. von Koenigswald places Solo Man on man's family tree as a branch of the Neandertal stock, which flourished widely on earth, mainly 60,000 or more years ago.

Dr. von Koenigswald journeyed here to attend the International Symposium on Early Man, held at the Academy of Natural Sciences of Philadelphia, March 17 to 20.

Among the eleven casts of this old human type exhibited at the symposium, Solo Woman can be recognized by a lighter skull and smaller brain than that of Solo Man. This is a sex difference among living races, no less than those 25,000 years old.

Solo men and women were probably cannibals, says Dr. von Koenigswald. Prehistoric peoples who thus ate their fellows did so mainly for magical benefits, as, for example, the belief that devouring the brain of an enemy would thereby enable the eater to acquire the dead man's power and strength.

Science News Letter, March 20, 1937



ON MICROFILM

This is the actual size of the microfilm which reproduces six pages of a book. Drawings and other illustrations, as well as the text, are copied faithfully.

AVIATION

Higher Octane Aviation Fuels Would Save \$1,000 a Trip

Meeting Learns of New Airplane So Far Only on Paper Which Will Be Capable of Much Higher Speeds

HOW THE commercial airlines potentially could save over \$1,000 per trans-continental trip from New York to Los Angeles was described at the National Aeronautic Meeting sponsored by the Society of Automotive Engineers. This is equivalent to carrying about seven extra passengers per trip at present one-way fare rates.

Using the super 100 octane anti-knock gasolines, after making the engine-design changes made possible by these fuels, is the way the theoretical economy could be achieved, it was disclosed in the technical report of D. P. Barnard of the Standard Oil Company of Indiana.

Each increase of one single unit in the octane rating of aviation fuels is worth up to five cents a gallon of gasoline, he showed in a study of the values of octane number improvements in aviation gasolines in terms of increased earning power of the current type transport planes, when proper provisions have been made in the original designs.

On a trans-continental flight from Newark to Los Angeles, with an airline distance of 2,524 miles, the benefit would be about \$68 for the increase of a single number in the octane rating. Theoretically, at least, a jump from the present 87 octane fuels to the 100 octane gasolines would thus yield a potential saving of \$1,064 for each trans-continental flight. With a fare of approximately \$140, one way, this is essentially the equivalent of carrying over seven extra passengers per flight.

The advantage of using high octane fuel for military craft was not computed by Mr. Barnard but he rated its value as even higher because small pursuit planes show improved performance in climb and speed, while big bombers have increased range and greater load carrying capacity.

New Plane Planned

National Advisory Committee for Aeronautics scientists at Langley Field, Va., have designed a large hypothetical airplane, at present only on paper, which would seem to have less

drag than modern transport planes and may have higher speeds than present craft of comparable power rating.

If the calculations, disclosed by Eastman N. Jacobs, some day become a practical reality they may bring improvements paralleling the development of the engine cowling of NACA which in recent years has revolutionized airplane design and increased airplane speeds.

Mr. Jacobs' hypothetical large airplane is the outgrowth of his studies on the major unsolved problem which stands in the way of further aeronautical progress—the flow of air over the wings of airplanes, or around airfoils, as they are called.

Scientists, pointed out Mr. Jacobs, can put small models of wing cross sections in wind tunnels and make their findings but there is no way of knowing whether the same things will occur in actual flight. "The situation," he declared, "with regard to the airfoil drag is particularly serious, because we have no equipment capable of studying the subject experimentally in the higher full-scale range of Reynolds Number in which we are at present most interested."

Applied Theory

Undeterred by this present lack of experimental equipment, Mr. Jacobs tackled by theory the problem of smooth, or laminar, flow and turbulent flow. Smooth flow of air over an airplane's wings makes for higher speeds while the rough turbulent flow brings in the drag which is the bug-a-boo of all airplane designers.

"If the turbulence is zero, as it sometimes is in free air, the theory, carried to its logical conclusion, seems to indicate that the transition point will not move forward toward the leading edge of the airfoil as it does in the wind tunnel," Mr. Jacobs reported. "If this supposition is true and other disturbances, such as turbulence originating near the nose or due to surface roughness, do not alter the situation,

such a conclusion has considerable practical significance. This practical significance is indicated by comparing the drag and speed of a large hypothetical airplane, designed to take advantage of the laminar flow over its forward surfaces, with the drag and speed of a modern transport airplane."

The conclusion, Mr. Jacobs indicated, is that material gains might be possible, but he quickly goes on to add that there is no certain knowledge. He suggests careful experiments with suitable equipment to determine whether the indicated gains are really possible in practice.

Passenger Comfort

Added passenger comforts which the next five years of aviation will bring were traced at the same meeting by H. O. West, superintendent of engineering of the United Air Lines Transport Corporation.

While sleeper planes have been used more than a year, the first planes originally designed for this purpose are just now coming into use, Mr. West said. At present the berth arrangement long used by the Pullman railroad cars will be followed. Eventually, however, something will have to be done to overcome fundamental handicaps of carrying an earth-bound sleeping arrangement to the airways. One such difficulty is that the passengers have nowhere to go, in the plane, while the steward is making up the berths. Thus future plans must devise a berth which can be made up easily and yet much more quickly than present types.

With longer overnight trips two meals must be served aloft and adequate galley facilities will be required. Hot meals should be served; but mainly the need is for maintaining heated, pre-cooked food at its proper temperature. Refrigerators too will be required, to preserve perishable foods.

On the large airliners of the future, on day service, swivel chairs and divans will be the rule. Lighting of the cabin may very well be indirect, with a separate generator for the lighting current. Ventilation is probably adequate in present planes but when high flying is accomplished the cabin will have to be air-sealed, and then the air will probably have to be recirculated. This will involve the use of filters to remove the smell of smoke and other odors.

So heavy is the burden of flying the larger planes of the present that in the future there will probably be a three-man crew, besides the steward or

hostess, said Mr. West. This third man will be called the flight engineer. He will be thoroughly familiar with the mechanical function of the entire plane. Seated in the cockpit behind the co-

pilot, the flight engineer will have his own instrument panel and will relieve the pilots from much detail outside the navigation of the plane.

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ANTHROPOLOGY

Has Lost Pale-Face Tribe Been Traced to New Guinea?

DISCOVERY of a new tribe of light-skinned natives, in the treacherous depths of New Guinea, is stirring anthropologists to ask:

Did roving seafarers, some primitive branch of the white race, find their way to New Guinea in the South Pacific, there to lose themselves in the heart of an island jungle?

That this did happen long ago, giving pale-face ancestry to a tribe that now numbers some 50,000 people, is the conviction of Jack Hides, discoverer of the tribe. These people in their lost world still live in the Stone Age. But they are not benighted savages. They raise spinach—much discussed vegetable in civilized circles. And they seemed extraordinarily healthy to their discoverer.

Mr. Hides, who brought this tribe of the interior to scientific notice, is a resident magistrate of New Guinea. His discovery, he finds, has awakened much interest among anthropologists. It suggested that New Guinea was settled by both whites and blacks—some branch of the Indo-European race, as well as the negroid people from Asia.

To Science Service, Mr. Hides gave the following description of how the unknown people impressed him:

"These people were short in stature. They were light-skinned, something similar to the Malays. They had large mops of brown-tinged hair, high cheek bones, and yet rather good features. They were bow and arrow people, and made beautiful axes of stone. They call themselves the Tarifuroro.

"Their methods of agriculture were the best I had ever seen. Their terraced gardens of an unusual squareness, marked off by pretty hedges of croton and hibiscus, were not unlike the Chinese market gardens we see in Australia.

"They grow sugar cane, ginger, bananas, sweet potatoes, spinach, mimica, and native asparagus. There were no taro or yams. They often brought us pretty baskets of brown salt, which they

obtained by burning logs of certain wood.

"I believe that farther to the westward of these people in the adjoining valley, which is even larger than the Tarifuroro, we will find an even larger population, and a more clearly defined Asiatic type.

"My reason for stating this is, as I traveled eastward across the Tari and Purari tableland, I found the light-skinned people merging into the darker-skinned Papuans, until just before I crossed the limestone barrier again, I found the real black Papuan men using the same methods of agriculture as the light-skinned Tarifuroro. It rather suggested to me that, at one time, these light-skinned people inhabited the whole of this tableland and were driven back westwards by the more virile Papuans."

Mr. Hides found the light-skinned tribe when he made an exploring journey, accompanied by a patrol officer, nine native policemen and 28 native carriers. Traveling up the Strickland River in a schooner, and thence up an unknown river to its source in dugout canoes, the party then climbed a difficult limestone barrier and found themselves on a high plateau inhabited by unknown thousands of New Guineans.

Doubt Expressed

It is not necessary to picture a white invasion of New Guinea, to account for the natives seen by Mr. Hides.

This is the view taken by an anthropologist noted for his studies of pygmies in New Guinea mountains. Matthew W. Stirling, chief of the Bureau of American Ethnology, says:

"There is an anthropological theory that an early wave of white migration swept across southern Asia to the Pacific. It is not impossible, if this be true, that traces of it might be discovered in the East Indies. Such an explanation has been offered for the Ainu of Japan and for the Polynesians.



OLD DOUBT

Mr. Howard shown examining the fossil horns of a musk ox-like animal and a stone weapon point found near the skull. Such inconclusive discoveries in various parts of America have long puzzled scientists. They could not agree whether ancient hunters were present when this kind of game roamed the country, or whether coincidence brought blade and beast near together.

"It is my opinion, however, that Mr. Hides probably encountered a new branch of the short-statured, light-skinned mountain peoples of the interior of New Guinea and passed from these to eastward toward the decidedly black-skinned Melanesians and was impressed by the contrast in skin color."

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PHYSIOLOGY

Illinois Giant Reported To Be Still Growing

HHEIGHT: 8 feet, 3¼ inches; weight: 395 pounds; still growing.

That is the amazing record of 18-year-old Robert Wadlow of Alton, Ill., according to the latest authoritative medical record. The measurements, based on the boy's own testimony and hospital records, are given by Dr. Charles D. Humbert of Barnard, Mo., (*Journal, American Medical Association*, Feb. 13). In the medical report, the young Illinois giant's identity is concealed by the initials, R. W.

The great Barnum laid down minimum requirements for giants in his famous sideshows. But he required a mere 7 feet, 2 inches. The Illinois giant already exceeds this modest requirement

by 13¼ inches and is still going up.

The young giant now picks his way about among the light fixtures in his modest home, where the ceilings are only a couple of inches higher than he is. Dr. Humbert, who makes a study of giantism, says he is still growing.

The Illinois giant belongs to the "preacromegalic type," thinks Dr. Humbert. The physician believes that the acromegaly process is already beginning and that in the near future the bones and soft parts of the boy's hands, feet and face will begin to enlarge, an evidence of the overfunctioning of the pituitary body.

Acromegaly is a growth disturbance due to over-activity of one part of the pituitary gland. It usually starts after maturity and the overgrowth appears chiefly in face, hands and feet.

Robert is now a college freshman, embittered by newspaper publicity and reluctant to be measured or to discuss his Gargantuan build. He makes his pocket money by posing for photographs, for which "his charges are variable and modest, but certain," according to Dr. Humbert.

The boy's appetite is enormous, his daily food consumption running as high as 6,000 to 8,000 calories. He tires very easily and sleeps much.

The average grown man does not require over 3,000 calories a day unless he is doing work requiring great muscular exertion.

At birth, the boy weighed 8½ pounds and at six months, 30 pounds. His growth curve has been steady and continuous, without noticeable spurts and upsets, according to the physician's records.

"One cannot predict when the growth curve will level off," states Dr. Humbert. "I think the lad is still actively growing."

The height limit of the U.S. Army in the World War was 6 feet 6 inches. Among 3,750,000 men between the ages of 18 and 30, only seven cases of giantism were found. Four of these men were only a little over height and were accepted for army service in spite of their disability, some of them serving as drum majors in army bands.

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NEW PROOF

A bone spear point found resting on the foot of an extinct mammoth—giant long-haired elephant—in New Mexico. This discovery by Edgar B. Howard of the Philadelphia Academy of Natural Sciences, and his finding of stone spear points surrounded on all sides by mammoth bones, clinches scientific belief that America was inhabited by man when these prehistoric big game animals were still alive 10,000 years ago. (See SNL Oct. 10, 1936. For another discovery by Dr. Frank H. H. Roberts, Jr.; see also SNL Nov. 2, 1935).

MEDICINE

Growth Control for Cells Would Cure Cancer

FIND a method of growth control for the millions of tiny cells that make up the body of a man and you will have the long-sought cure for cancer.

Tremendous difficulties must be overcome before this happy solution of the problem can be reached. The individual cells of the body are so small they can be seen only with the aid of powerful microscopes. Each of them must have food and water and oxygen for breathing, in order to live and do its job. Scientists in many laboratories are trying to find what the cells require for nourishment and how much of these substances they must have.

Is it too much or too little of some foodstuff that makes cells go wild and spend all their energies in growing, so that other cells are crowded out and die? This tendency of cancer cells to devote their lives to malignant growth is probably inherited, born in them when they are first formed. Injury or irritation may be the torch that sets off the wildfire growth.

Many of the irritations and injuries might be avoided, thus preventing some cases of cancer. Inherited tendencies to cancer can be bred out of laboratory animals, such as mice, but this method of control could hardly be applied to men and women.

Scientists trying to find the cure for cancer know they must search further, probing deeper into the life of the cell to learn how it grows and what is needed to make it grow in an orderly, normal way.

Difficult as the problem is, scientists believe it can be solved. Much has already been accomplished in growth control of another kind. Growth of the body as a whole is controlled by the pituitary gland, it is now known. This was learned from the discovery that dwarfs and giants of certain types had diseased pituitary glands. Years of research on this problem led finally to an extract from the gland that helps children with dwarf tendencies to grow.

It is reasonable to hope that the even more difficult step of achieving control of the growth of cells can be accomplished.

"When this day comes we will have the cure for cancer," says Dr. John J. Morton, cancer authority of the Strong Memorial Hospital in Rochester, N. Y.

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ZOOLOGY

Groundhog Will Soon See That Much-Debated Shadow

See Front Cover

CANDLEMAS Day is a good month too early for any groundhog to come out and look for his shadow. These rodents are very determined sleepers, and have never been known to break their winter sleep, in the southern part of their range, until about the first of March. Farther north, they sleep longer still, and may not appear until nearly May. In any case, the groundhog may be depended upon to wait until winter is surely over before he emerges; no silly business of sticking his nose out into early-February cold waves for him!

The picture on the cover of this issue of the *SCIENCE NEWS LETTER* also demonstrates convincingly the sound observational commonsense that underlies the groundhog's other name of woodchuck.

Science News Letter, March 20, 1937

PHYSIOLOGY

Glands Increase the Body's Resistance to Poisons

EXTRA POWER to fight poisons or other damaging influences and also to adapt to extreme cold or other change in environment are given to the body by two small glands on top of the kidneys, the adrenals.

Evidence for this new and important function of the adrenal glands, from which comes the well-known adrenalin, is reported by Dr. Hans Selye of McGill University, Montreal. (*Science*, Mar. 5.)

"One of the most important functions of the adrenals," Dr. Selye concludes from his studies, "is to increase the resistance to alarming stimuli."

By alarming stimuli Dr. Selye means such things as exposure to changing temperature in the surroundings, excessive muscular exercise, poisonous doses of various drugs or substances apt to reduce dangerously the amount of sugar in the blood.

These alarming stimuli may cause a number of conditions, such as lowered blood pressure, lowered body temperature, loss of water from the blood and the formation of gastric and intestinal ulcers, Dr. Selye found. These conditions are almost identical with those produced in patients whose adrenal glands are not functioning fully because of disease or injury or in animals whose adrenal glands are removed.

The poisons or other alarming stimuli cause much more pronounced symptoms, Dr. Selye reports, in animals lacking adrenal glands than in normal animals. Consequently he believes the adrenals act to increase the body's resistance to such stimuli.

They also play a very important role in the first stage of the body's adaptation to conditions of the environment. This is because most stimuli are alarming when the body is first confronted with them. By helping the body resist the alarming stimuli, the adrenal glands also help it to get used to or adapt to the stimuli. After the first stage of adaptation, however, the job is completed by changes in other tissues.

Science News Letter, March 20, 1937

PLANT PHYSIOLOGY

Plants Need to "Sleep" For Normal Growth

NIGHTLY sleep, or something very like it, is as necessary to plants as it is to men and animals, recent researches at the Smithsonian Institution indicate. The work was done by Dr. Earl S. Johnston of the Smithsonian Institution and Dr. Paul R. Burkholder of Connecticut College.

It has to do with the physiological reaction to light on the part of auxins, the substances within plants that cause growth. Strong sunlight was found to be destructive to the auxins, while "controls" containing like amounts of the substances were left with much greater growth-promoting power after being "exposed" to darkness for equal periods.

The destruction or inactivation of the growth substances, the experimenters found, varied with the length and intensity of the illumination. It also varied, as might have been expected, with the species of plant. Some plants, such as the sunflower, are much more sensitive than others—so sensitive, in fact, that its movements seem superficially to be controlled by an animal-like intention.

Offhand it might appear somewhat paradoxical that growth should be most rapid in darkness, yet the phenomenon has often been observed. From these experiments it appears that light and darkness play complementary roles in growth. Light is required for the synthesis of the auxins in the growing tip of the plant, but, once formed, they are most effective as growth's activator in darkness.

*Science News Letter, March 20, 1937***IN SCIENCE**

ANTHROPOLOGY

Skeleton with Big Teeth May Show Old American Type

DISCOVERY of an ancient skeleton with remarkably big molar teeth is announced by Dr. Cyrus N. Ray, of the Texas Archeological and Paleontological Society.

Dr. Ray, who unearthed the skeleton about 18 miles from Abilene, Texas, believes that it may reveal a prehistoric type of American who camped and hunted in this region. Previous excavations yielded a deeply buried campsite in an eroded river bank, about half a mile distant.

The individual represented by the skeleton had a head very long in proportion to width. Describing the teeth as unusual in both size and shape, Dr. Ray states that the molars "appear to be nearer to the anthropoid pattern"—that is, more ape-like—than any encountered in his previous discoveries.

The first and second molars measure one-half inch from front to back, which means considerably more grinding area than modern man carries on his back teeth. The third lower left molar of the Texas skeleton is even longer, being measured at nine-sixteenths of an inch in length.

Large teeth were a trait of early and primitive humans.

When unearthed, the Texas skeleton was found lying with bent knees, buried in a cist, or primitive coffin made of stone slabs.

Science News Letter, March 20, 1937

ZOOLOGY

Humane Traps Used On Indian Lands

HUMANE traps, that catch and hold animals with a loop of flexible chain and cannot mangle their catch, have been ordered to replace steel jaw traps on all Indian lands. A holiday for wildlife has also been declared. Only wild animals harmful to crops and domestic animals may hereafter be exterminated on lands under the Office of Indian Affairs.

Science News Letter, March 20, 1937

THE FIELDS

CHEMISTRY

Artificial Stone is Now Being Made From Waste

SYNTHETIC stone is now being produced both in England and Russia from waste rock. Granite, diabase or basalt fragments are heated and cast in molds while molten. Floor tile, curb-stones and other products are obtained. A cheap source of fuel is needed to make the method economical, reports the U.S. Bureau of Mines.

Science News Letter, March 20, 1937

SEISMOLOGY-ENGINEERING

Geologists' Aid Needed In Planning Buildings

EARTHQUAKE-PROOF buildings for regions where major earth shocks are liable to occur need the benefit of geological knowledge as well as the skill of architect and engineer, Capt. N. H. Heck of the U. S. Coast and Geodetic Survey told an audience of geologists. Earthquake danger to a building varies greatly according to the kind, depth, and arrangement of rock and earth layers in the spot where it is to be built, and its design may need to differ radically from what would be required for a building to be erected only a few hundred yards away, where the geology of the terrain changes.

Capt. Heck described a number of different types of earth movement, each of which causes differences in both kind and degree of earthquake danger to man-made structures. There may be movement along a vertical fault or rock-crack in either up-and-down or sidewise direction; there may be oblique slips, or even horizontal slidings of deeply buried rock strata. There are also various kinds of sinking and humping-up movements, which may not be associated with earthquake shocks at all.

And when the movements do occur, their effects on buildings differ according to the kind of substratum on which the foundations stand, whether rock, sand, clay, natural alluvium, or made land. The amount of water in the soil also is an important factor. It is usually assumed that the danger to a building

on loose soil or sand is greater than on solid rock, but there are circumstances under which the reverse is true, Capt. Heck said. And sometimes a building may escape damage while delicately aligned machinery within it is thrown out of line.

Capt. Heck also offered a new concept of an earthquake epicenter. This has always been thought of as a sharply limited spot or small area where the principal movement of an earthquake occurs. Now, he stated, it is necessary to think of the epicenter as the spot where the earthquake movement starts; but the site of the movement may itself migrate as the earthquake develops.

Science News Letter, March 20, 1937

BIOGRAPHY

Travels of Early Naturalist Are Traced and Mapped

WIDE-RANGING travels of an early American naturalist, Thomas Nuttall, who wandered and collected specimens all over the United States when most of the country was still "Wild West," have been traced by Dr. Francis W. Pennell, curator of botany at the Academy of Natural Sciences of Philadelphia.

Although he was the most traveled of our early naturalists, and especially famous for his work in botany, the whole course of Nuttall's journeys has never before been traced. Sources of information include works of other early travelers, incidental contemporary notices, records of plants and birds scattered through Nuttall's own works, and a remarkable discovery of old letters and manuscripts recently made by Mrs. John R. Delafield at "Montgomery Place" in Dutchess County, New York.

For one who did all his traveling between the years 1807 and 1836, Thomas Nuttall covered an astonishing territory. He traveled extensively through the more settled parts of the United States, down the Ohio, through the southern Appalachians, through the Great Lakes to the Wisconsin River, down the Mississippi and up the Arkansas River to the present Oklahoma, up the Missouri only a few years after Lewis and Clark, and later by the Oregon Trail across the continent to the mouth of the Columbia River, thence across the Pacific to Hawaii and back again to California. He collected thousands of plants, was responsible for the naming of scores of species, and introduced many flowers into cultivation.

Science News Letter, March 20, 1937

ASTRONOMY

Going to Desert Island To Watch Total Eclipse

ASTRONOMERS from the United States will go to a real desert island in the South Pacific next spring and spend a month there for the sole purpose of looking at the sun for four minutes and ten seconds. But the journey is reckoned well worth while, for this intensive sun-watching will be done during an unusually important total eclipse of the sun, which will take place on the morning of June 8.

The party will go as a joint expedition of the National Geographic Society and the U. S. Navy. The scientific program has been initiated and is being directed by Dr. Lyman J. Briggs, chairman of the Research Committee of the National Geographic Society. Scientific leader of the expedition will be Dr. S. A. Mitchell, director of the Leander McCormick Observatory, University of Virginia. Capt. J. F. Hellweg, superintendent of the U. S. Naval Observatory, will have charge of the Navy's participation. Included in the personnel will be: Dr. Paul A. McNally of Georgetown University, Dr. Heber D. Curtis of the University of Michigan, Dr. Floyd K. Richtmyer of Cornell University, Dr. Irvine C. Gardner of the National Bureau of Standards, John W. Willis of the U. S. Naval Observatory, and a photographer from the National Geographic Society.

The expedition, with its equipment of telescopic cameras, spectrographs, and other instruments useful in eclipse work, will go to Honolulu on a regular Pacific liner. There they will transfer to the Navy tender "Avocet," formerly a mine-sweeper, and on May 6 will steam away toward Samoa. Two-thirds of the way there, they will come to the Phoenix Islands. Between two of these, Enderbury Island and Canton Island, they will make their choice, and there they will land themselves and their equipment.

Both these spots in the ocean are true desert islands, mere coral reefs without even a tree. The expedition will have to take all provisions, even drinking water, and will have to stay for a solid month. The "Avocet" will stand by, since there is of course no harbor for even a small ship. Indeed, the better of the two islands for observing purposes, Enderbury, is only two and one-half miles long and one mile wide.

Science News Letter, March 20, 1937

BIOLOGY

Germ-Free Guinea Pigs

Animals and Plants for Laboratory Purposes Produced As "Bacteriological Blanks" by Young Scientist

By DR. FRANK THONE

GERMS are the real cosmopolites, the true Citizens of Everywhere. There is no corner of creation where they are not found—except, perhaps, the molten lava lakes in the very throats of volcanoes. They float in the air, even up into the stratosphere. They swim in all waters, even the almost-boiling springs of Yellowstone Park. They swarm in the earth in unimaginable billions of billions. They cover all sticks and stones, all trees and lowly plants, all the works that the hands of men have wrought.

Human Hosts

Most important of all, from our own egocentric viewpoint, they inhabit Us. They are on our skin and hair and teeth. They are in our noses and mouths and lungs. They are in our digestive tracts from end to end: before we get the good out of any meal we eat, our internal gardens of plant and animal microorganisms help themselves first. And what is true of ourselves is true of every animal in the world, from the mighty whale and the lumbering elephant to, dainty humming bird and the humblest worm that creeps in the earth.

We have been too much in the habit, perhaps, of regarding germs or microbes

as always harmful. As a matter of fact, the great majority of them are probably harmless, and many kinds are known to be distinctly beneficial. But that is another story. Sufficient for present purposes is the regrettable fact that many germs are harmful, either by making us sick, or injuring our livestock and crops, or causing decay in our food and drink. And in spite of all the researches of the thousands of scientists who have worked on germ problems since the days of the mighty Pasteur, we are still lamentably ignorant of the nature of germs and of their ways of living at our expense.

A standard thing for bacteriologist or parasitologist to do, when he has a one-celled plant or animal suspected of mischievous tendencies, is to try it on a guinea pig. These docile little martyrs of science give up their lives in thousands every week, that our own lives may last the longer and be the more free from aches and ills.

Unsterile

Yet whenever a scientist with a culture of germs decides to "put it through a pig," he is up against a dilemma. For his "pig" is already full of germs, in a most amazing variety, exercising effects so completely unknowable by present methods of research that the

scientist simply has to shut his eyes to them and pretend they are not there at all. A bacteriologist who would no more think of planting a culture of germs in a tube of broth or on a plate of gelatine not known to be completely sterile than an artist would think of matching colors on a slab of mud, will put his germs through a guinea pig, or rabbit, or other animal that is a regular walking universe of alien germs.

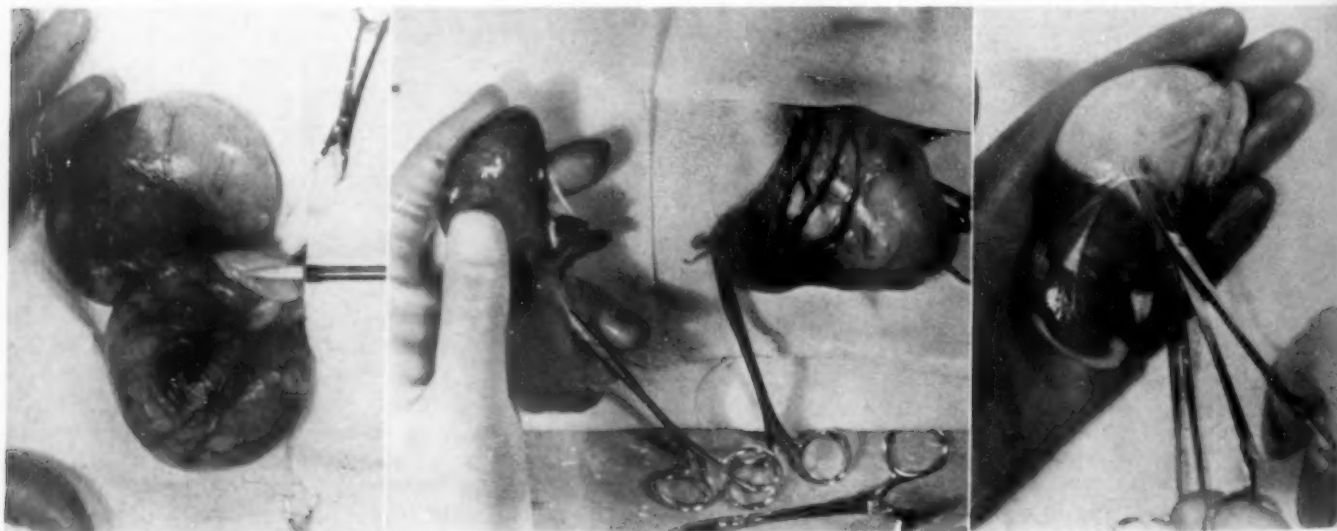
The only possible scientific defense of his paradoxical practice is that you can't get any guinea pigs that are as sterile as a well-steamed tube or plate of culture medium. If you steamed your "pigs" until they were sterile they would also be dead, and therefore useless for live-culture purposes. It is a case of a germ half-loaf being better than nicely sterile no-bread.

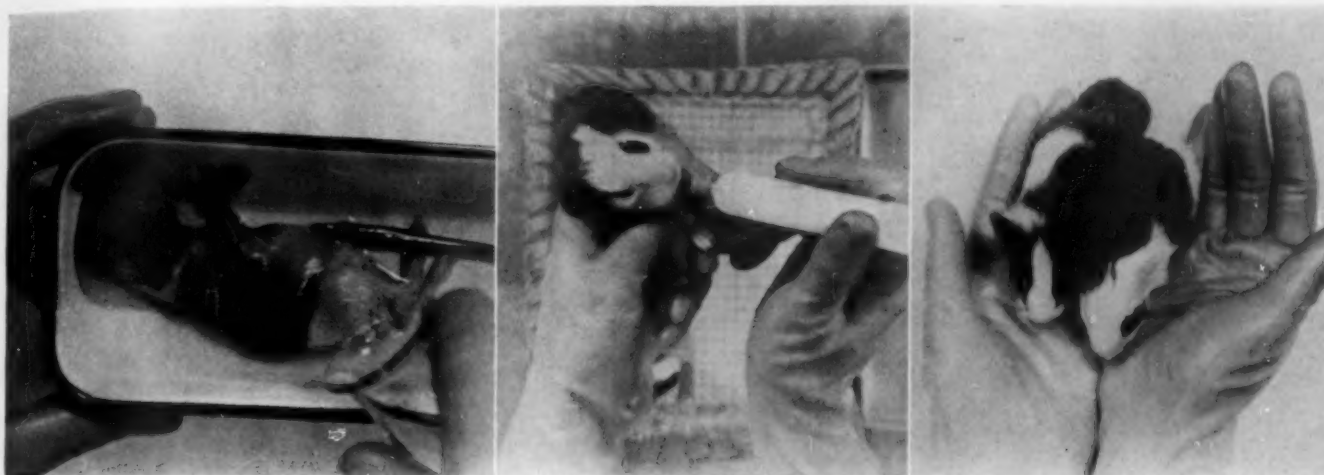
Now Solved

But scientists are due to be relieved of this dilemma very soon. A young member of the Notre Dame faculty, Prof. James A. Reyniers, combining the mechanical planning of an engineer-inventor, the delicate-fingered skill of a surgeon, and the dogged determination that belongs to every true research worker, has developed a set of elaborate mechanisms, and perfected a technique

CAESARIAN BIRTH

Left: The uterus is brought into the germ-free air of the operating cage. Center: The umbilical cord is severed. Right: The membrane is quickly stripped from the baby animal.





for their use, that will bring guinea pigs or any other experimental animals, within reason, into the world free from any taint of microbic contamination, will keep them germ-free through their whole lives, and will even permit germ-free parents to mate and bring forth germ-free offspring for as many generations as may be required. It is his ambition eventually to supply germ-free guinea pigs, or germ-free anything else that may be wanted, to biologists everywhere for research purposes.

Unborn Are Free

Prof. Reyniers starts with the fact, long known to biologists, that unborn animals are usually germ-free. The chick in its shell, the developing mammalian fetus in its mother's womb, learn of the world's microbic wickedness only when they emerge into the light of day. They receive their initial contamination while they are being born, and with the first air they breathe, and in the first food they take. Bring them to birth in completely germ-free surroundings, and they will remain innocent of germs as long as you guard them well.

That sounds simple, but it is terrifically difficult to turn into accomplished fact. Yet Reyniers has turned the trick. Already he has reared, in his laboratory at the University of Notre Dame, over 2,000 germ-free guinea pigs, as well as germ-free chicks, rats, mice, rabbits, cats, insects, and several plant species. He works with guinea pigs mostly, because they are docile and easily handled. Cats are the hardest, he says; they fight, puncture rubber gloves with their claws, letting in germ-contaminated air and spoiling the whole job.

To get germ-free guinea pig infants from ordinary germ-infested mothers, you cannot let them be born in the

natural way. They would become contaminated at once. Therefore they must be brought into the world by means of the well-known Caesarian operation, performed under aseptic precautions that even human patients never experience. It requires an operating discipline of Prof. Reyniers and his assistants that combines the clock-like precision of a gun-crew with the surgeon's swiftness and sensitiveness.

First, a pregnant female guinea pig known to be within two or three days of delivery is selected. All her hair is removed with a depilatory, for hair is notorious as a lurking-place for contaminating germs. She is scrubbed clean, disinfected, sealed in a sterile Cellophane-lined envelope, placed on the operating board. All of this is done under a glass case, with careful aseptic precautions.

Operating Room

Then the real operation begins. It takes place in a specially constructed metal cylinder, with an opening underneath through which the animal can be introduced. Cellophane covers this opening also. On opposite sides of the cylinder are pairs of arm-size openings, each with a pair of long surgeons' rubber gloves tightly gasketed in. This permits two operators to work, each of whom can watch through a glass-covered porthole on the upper side of the cylinder. The air inside is filtered free of germs, and the whole interior can be sterilized at any time by means of sprays admitted through permanently attached pipes. Everything is checked carefully for leaks before the operation starts, for a leak means contamination.

When the anesthetized guinea pig has been thrust up through the trap in the bottom, and lies under the stretched

FIRST EXPERIENCES

Left: The newborn animal gets a germicidal bath. Center: Sterilized milk is fed by hand every hour. Right: Ready to begin six weeks of germ-free existence.

sheet of transparent cellulose, Dr. Reyniers makes his first incision. Instead of scalpels, electric needles are used for all cutting, because they automatically sterilize all tissue they separate, and also stop all bleeding. The edges of the protecting transparent sheet are sealed to the edges of the incision.

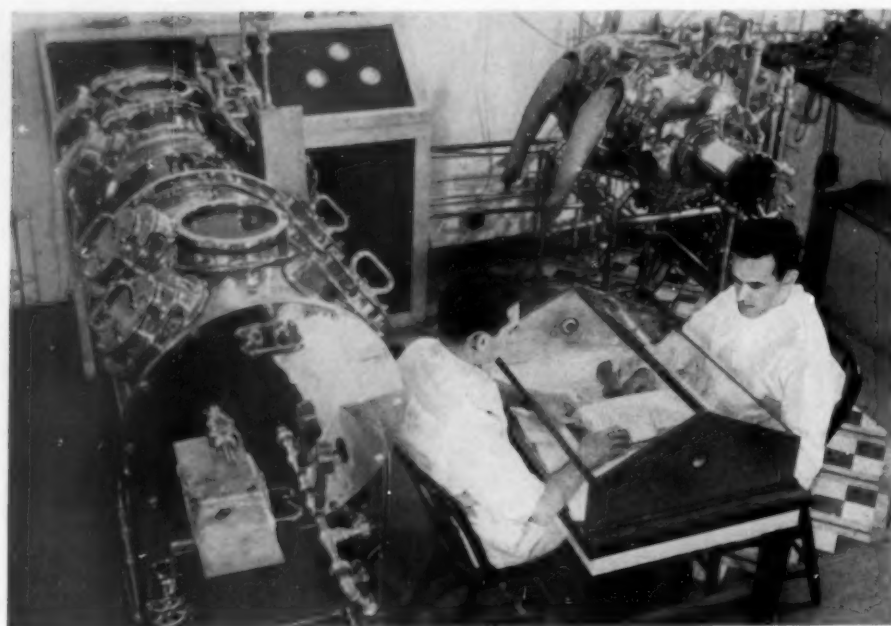
Swiftly the operators work. They lift out the uterus, containing the litter of unborn young. They open its side, removing the little animals one by one, each still enclosed in its protecting envelope, known to scientists as the amnion. In turn each amnion is opened, the little guinea pig slipped out, its umbilical cord clamped and severed, a germicidal bath administered, normal breathing stimulated if necessary. The little "pigs" have been born.

The mother may die during the operation, but this is not necessarily the case. Prof. Reyniers states that he has had female animals that produced second and third litters for him under his technique.

Repeated Tests

At every stage during the operation, bacteriological tests are made: of the amnion as it is opened, of nose, mouth, all body openings of the young as they are brought forth. If signs of germ life appear at any stage, the whole laborious procedure is ruthlessly set down as unsuccessful, and the experimenters start over again.

After the whole litter, usually three or four little guinea pigs, has been born, a final drastic test for germlessness is



THE OPERATION BEGINS

Prof. Reyniers (right) and an assistant prepare a guinea pig mother for the Caesarian operation. At left, and in right background, are the germ-free, air-conditioned tanks where the little animals are born, live, and die in an aseptic world—all in the cause of scientific research.

made. One of the new-born animals is instantaneously killed and its body reduced to hamburger in a meat-grinder attached to the inside of the operating machine. Samples of this guinea-pig hamburger are put into 22 tubes, each containing a different kind of germ food. If any germ is present anywhere in the animal, this test is calculated to show it up. If the "hamburgered" guinea pig passes this test, it is assumed that its brethren are all right also—at least at this stage of existence.

Sterile Food

Then the remainder of the litter is removed, through an opening in the end of the operating cylinder, into a second cylinder somewhat like it, but fitted out as a rearing cage. Again all air is made germ-free, and all water and food given to the young animals is kept rigidly sterile. They must be hand-fed, every hour, day and night, on a sterilized milk mixture, during the first five or six days of their lives. Every day a bacteriological test is made of every accessible body cavity. At the end of several weeks, another member of the litter is sacrificed on the altar of bacteriological precaution, via the meat grinder. If all these tests still show no germs, the remainder of the litter are removed into still another cylinder, the storage machine.

There, still on a regimen of absolutely

germ-free air, water, and food, the young guinea pigs grow up. At six months of age they are mature, ready for use in research experiments, or they can be mated for the production of germ-free young. Of course, if both parents are germ-free, there is no likelihood that the mother will cause the contamination of her own young at birth. The tedious Caesarian operation can therefore be dispensed with and the young born in the natural way, and suckled in the natural way afterwards. This should make for easier and more rapid production of experimental stock, once Prof. Reyniers is able to get on a quantity production basis. There appears to be no reason why germ-free animals should not be bred in indefinite numbers of generations, if due precautions are always maintained.

Expensive

The elaborate mechanical set-up necessary for the production of germ-free animals and plants has necessarily represented a great deal of labor and expense. The cost of one of the machines, on the present build-to-order basis, is equal to that of a rich man's automobile. However, if numbers could be ordered at the same time, the cost could be reduced to that of the average citizen's auto, Prof. Reyniers states. The governing officers of the University of Notre

Dame have been so impressed by his work and its possibilities that they have placed a new \$500,000 building at his disposal. Now he is looking hopefully about for the means to fill it with machinery for producing guaranteed germ-free guinea pigs.

There will be no lack of scientific work in the world for any number of germ-free animals he may be able to raise; he is confident of that. Research in filterable viruses, that cause such diseases as infantile paralysis, smallpox, and the common cold, can absorb thousands of such animals, for the viruses must have living hosts if they are to be grown successfully. And at present there are dozens of problems about them that cannot be solved with guinea pigs already loaded with other germs that confuse the results.

Research in immunology offers another large opportunity for the employment of germ-free animals. Again, the presence of unknown germ species in unknown numbers, infesting all possible experimental animals now available, makes it impossible to tell whether the production of a given antitoxin or other germ-fighting substance is a simple reaction to the invasion of the enemy germ, or whether the "resident" germs already present had something to do with it. If you can take an animal that has no germs at all, and inoculate it with just one kind of germ, then you have simplified the problem very greatly, and can hope for an intelligible answer.

Complex Causes

Allied to this second problem is a third, that still awaits solution. Are some diseases, perhaps, caused by several kinds of germs acting together, just as a cornfield may be ruined not by one species of weed but by several different species invading in succession? It has been suggested that the common cold is a disease of this kind. If you can start with a "blank" experimental animal, and give it only the kinds of germs you choose to let it have, there is a chance to get somewhere, out of the present confusion.

These are only sample research problems. Dozens more lift their heads over the horizon. If Prof. Reyniers is able to realize his ambition to be scientific godfather to thousands of germ-free guinea pigs, he need never be concerned lest his furry little protégés lack employment.

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Science News Letter, March 20, 1937

MEDICINE

Cancer Not Caused by Virus Columbia Scientists Find

CANCER is not caused by a virus. This is the opinion, contrary to that of some scientific investigators, of Drs. J. W. Jobling and E. E. Sproul of Columbia University College of Physicians and Surgeons.

New experiments with tobacco mosaic and cowpox viruses and the famous Rous chicken tumor, supporting the opinion that cancer is not virus caused, are reported by Drs. Jobling and Sproul, (*Science*, Mar. 12).

Instead of being a virus, they think the agent that causes the chicken tumor is something produced by abnormal physical and chemical processes in the cells of the chicken's body. This substance or agent has the chemical nature of a lipid, which is in the fat class. Consequently, the scientists reason, it is unlikely that this substance can reproduce itself. How this substance can cause the tumor disease is explained as follows:

"It seems probable that it possesses

the ability when injected into normal animals under proper conditions to stimulate normal cells to produce a similar substance and thus perpetuate the disease."

The belief that cancer is caused by a virus is based, Drs. Jobling and Sproul point out, on the demonstration that the tumor-producing agent of some chicken tumors can pass through a Berkefeld filter without losing their tumor-causing activity. A disease-producing agent which retains its activity after passage through a Berkefeld filter is generally held to be a virus, so the chicken-tumor-producing agent was classed as a virus.

If the chicken tumor is caused by a virus, then viruses must be classified according to their chemical properties. The virus of tobacco mosaic is a protein and cowpox virus, from which smallpox vaccine is made, is also protein, but the chicken tumor virus is a lipid.

Science News Letter, March 20, 1937

AGRICULTURE

Bacteria, Molds and Yeasts Promise Farm Problems Solution

BACTERIA, molds and yeasts, more noted now as disease-bringers and spoilers of things than for their useful activities, were hailed as potential factors in the solution of America's agricultural problems by Prof. Ellis I. Fulmer of Iowa State College, speaking before the Midwestern Conference of Agriculture, Industry and Science.

Farming, Prof. Fulmer pointed out, is essentially a chemical manufacturing process. The farmer is foreman in a chemical factory, wherein his crop plants are living machines using the energy of sunlight to make carbohydrates, fats, and proteins out of raw materials from air and earth. In the process, energy is woven into the things that come out as end-products.

Formerly the farmer cashed in on the release of a large part of that stored energy by feeding crop products to his work animals. Now he uses tractors and power machinery instead of horses and

mules. So the products pile up, creating economic crises which can be only temporarily solved by crop limitation methods.

A considerable part of the answer can be found, Prof. Fulmer pointed out, in turning over the job of digesting carbohydrates (starches and sugars) to bacteria, molds, and yeasts. These use up part of the energy in their life processes, but they turn back to the chemical industrialist a great variety of liquid fuels, solvents, ingredients for explosives, etc. Prof. Fulmer displayed a list of more than forty products that can be obtained from the microorganic fermentation of carbohydrates, only a few of which have present economic uses.

Unfamiliar Uses

Most of us are familiar with starch mainly as white stuff used in stiffening shirt fronts and making cornstarch pud-

dings, and we know syrup principally as a thick brown liquid that gets poured on pancakes—and unaccountably smeared all over children's faces. Dr. Norman F. Kennedy of the Corn Industries Research Foundation told the conference of a number of less familiar but very important uses of these two principal industrial products of corn.

Starch is used in enormous quantities in the manufacture of textiles, long before they are cut and sewed into shirts or sheets. It plays an important role in the production of paper, twine, burlap bagging, and many kinds of adhesives. Syrup from corn also has its uses in the textile and paper industries, and in such diverse industries as tobacco manufacturing and the tanning of leather.

Science News Letter, March 20, 1937

SEISMOLOGY

Earthquakes During "Storm" Were Difficult to Trace

THE two earthquakes of March 8 and 9, respectively—Monday's at San Francisco, Tuesday's a renewal of the recent Midwest shocks—have left seismologists puzzled. Instruments in the regular seismological observatories over the United States and Canada seem to have ignored the San Francisco disturbance. At any rate, no reports from these observatories have been received in Washington. Yet the battery of "strong-motion" records, a special type of seismograph that works only when jarred hard by a strong local shock, went into action in the San Francisco region with almost every one of its twenty instruments.

One thing that may have interfered with the records of some of the stations was a marked microseismic storm that was in progress when the San Francisco quake occurred. Microseisms are rhythmic minor earth tremors that keep on coming in for hours on end, like sea waves in a storm. Many scientists, indeed, believe that they are associated with the passing of major storm areas, such as the one that passed up the northern Atlantic during the past two or three days. The instruments at Canisius College in Buffalo, near Lake Erie, were busy all Sunday night and most of Monday writing microseism records, and show no trace of the disturbance on the California coast.

The second Midwest shakeup wrote its records on a number of instruments, but although the disturbed area was in the middle of a veritable ring of observatories its epicenter could not be

pinned down accurately on the map. This was characteristic of the first shock on March 2, also. Not all earthquakes have good, sharply defined epicenters; some of them seem to originate over a whole area rather than at a single given place.

While the two "home" earthquakes kept Americans interested, Central America slipped one past unnoticed except by scientists. On the morning of Tuesday, March 9, at 10:40.2, eastern standard time, a strong shock occurred at approximately 8.9 degrees north latitude, 83.8 degrees west longitude. Determination was made by the U. S. Coast and Geodetic Survey.

This is not far from the locality where a destructive earthquake occurred on July 18, 1934, wrecking a wharf and other structures in the towns of David and Puerto Armuelles in the Republic of Panama.

Observatories reporting to Science Service were those of Fordham University, Canisius College, the Franklin Institute in Philadelphia, Williams College, the University of Michigan, the Dominion Observatory at Ottawa, and the station of the U. S. Coast and Geodetic Survey at Tucson, Ariz.

Science News Letter, March 20, 1937

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MEDICINE

New Chemical Saves Lives of Type III Pneumonia Patients

The Dye, Prontosil, Already Entered in Battle Against Streptococci, Now Finds New Usefulness

A NEW victory in the fight against pneumonia is reported by Dr. Ralph R. Mellon, director of the Western Pennsylvania Hospital Institute of Pathology, Pittsburgh.

Prontosil and its close relative, Prontylin, chemical compounds already hailed as life-saving remedies in cases of deadly streptococcus infections, are proving effective remedies for Type III pneumonia. Serum treatment has not been satisfactory in this pneumonia although Types I and II pneumonias can be cured by use of the proper serum.

Reports of patients treated with these chemicals were given by Dr. Mellon before scientific audiences in Los Angeles and Pasadena.

Of 9 Type III pneumonia patients treated with the chemicals, 7 recovered and 2 died. These figures are exactly the reverse of those for a group of 9 patients who were not given the chemical treatment. In this group, 7 died and only 2 recovered.

The number of patients treated is not large, but studies of the chemical treatment for pneumonia in mice and rats adds to the evidence for the value of the new remedy. These studies have been going on at a number of institutions since the value of Prontosil for streptococcus infections, such as childhood fever, septic sore throat, scarlet fever and erysipelas, was first announced.

Dr. Mellon and associates studied the effect of Prontosil and Prontylin on pneumonia in rats rather than mice because they believe pneumonia in rats is more like the human disease. In a group of 14 rats infected with Type III pneumonia, the deathrate was 85 per cent. These rats had not had any Prontosil treatment. In another group of 13 rats with Type III pneumonia, Prontosil treatment brought the deathrate down to 23 per cent.

Chemical treatment of pneumonia is not new. Many years ago Dr. Lloyd Felton of Harvard Medical School studied the action of various chemicals, including sulfanilamide, the active part of Prontosil, in pneumonia. When a successful serum treatment for Type I pneumonia was developed, however, the idea of chemical treatment of the pneumonias was abandoned. Scientists have since been trying to develop equally successful serums for all the 32 pneumonias, especially the first four types. Successful serums for Type I and Type II are now available.

Science News Letter, March 20, 1937

ECOLOGY

Shelterbelt Trees Live Despite the Drought

TREES planted in the West's much-controverted shelterbelt area show high survival percentage despite two years of desperate drought, the U. S. Forest Service reports. Survivals average 550 trees to the acre, out of an average of 740 planted.

Chinese elm and cottonwood that were 18 inches high when planted in the spring of 1935 are now 15 and 16 feet high. Species showing best growth include green ash, cottonwood, Chinese elm, red cedar and Ponderosa pine.

Science News Letter, March 20, 1937

Asphalt roads colored red are found helpful for visibility in night driving.

An octopus in an Australian aquarium hatched a quarter of a million eggs in one brood.

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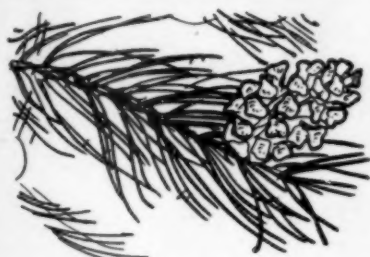
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ECOLOGY

NATURE RAMBLINGS

by Frank Thone



Pine and Prickly Pear

PINE trees and prickly pear cacti are in some ways surprisingly alike.

We seldom think of them as sharing common properties, to be sure. Traditionally, cacti are creatures of the desert—of heat and glaring sun and parched aridity. Equally by tradition, pines are of the North, of fogs and weeping rains and soggy, mossy ground. Kipling's "Recessional," dividing the world between Palm and Pine, expresses perfectly the common notion of tree geography; and Longfellow's "Evangeline," setting the chill but moist Acadian landscape with "murmuring pines and hemlocks," gives a good popular-ecological picture of the pine's habitat.

But at least one genus of cacti, the prickly-pears, are by no means confined to torrid lands, nor yet to deserts in the ordinary sense of the word. And the genus *Pinus* has deep overlaps into the territories of both palm and cacti.

Prickly-pear cacti grow native and naturally in such decidedly un-desert States as Illinois, Michigan, New Jersey, Florida, and far northward into the Peace River valley in western Canada. In Florida they even grow in swamps; in sub-Arctic Canada they hold out against winters six months long.

People often account for their presence in these unexpected places by supposing that they are escapes from cultivation, but such is not the case. They occupy waste lands—the sand dunes of Lake Michigan and the seashore, rocky clifftops and hillsides where other plants do not thrive because of lack of water and mineral nutrients. They would as readily spread into good plowland as any other weed, but for the fact that other plants rapidly outgrow them and outshade them—and cacti cannot tolerate shade.

Of pines a very similar story can be told. As the cacti venture far into the North, so do the pines march southward. The dry plateaus of Mexico and our own Southwest have abundant growths of pine, and pines form the greater part of endless, monotonous forests in Florida and over the whole Coastal Plain of the South.

In this sandy soil, which has too little nourishment for the faster-growing competing plants that dominate richer areas, the slow-starting, patient-growing pine and prickly pear manage to pick up their livings, and are frequently found growing together in quiet vegetable amicability. They are far from Acadia, far from Arizona, yet they are thoroughly and comfortably at home.

Science News Letter, March 20, 1937

PUBLIC HEALTH

Flu Vaccination Successful In New Jersey Colony

VACCINATION against influenza has succeeded in actual practice.

A group of men and boys at New Jersey State Colony were protected against this disease during an epidemic by vaccination with active human influenza virus, Drs. Joseph Stokes, Jr., Alice D. Chenoweth, Arthur D. Waltz, Ralph G. Gladen and Dorothy Shaw, of the University of Pennsylvania and Children's Hospital, now report. (*Journal of Clinical Investigation*, March.)

The vaccine was given at the outbreak of the influenza epidemic in and around Philadelphia in February and March last year. In the vaccinated group of 110 men and boys, 3 had typical influenza with fever. In an unvaccinated group of 550 at the same institution, 12.5 per cent developed influenza with fever.

Science News Letter, March 20, 1937

Cities in Mesopotamia had kings as early as 3000 B.C.

THE LIVING WORLD

By Samuel H. Williams

PROFESSOR OF ZOOLOGY AND ASSOCIATE DIRECTOR OF THE UNIVERSITY LAKE LABORATORY, UNIVERSITY OF PITTSBURGH

★ **This new book provides for the first time a comprehensive text for courses in nature study**

Based upon material which the author has used for a number of years in his classes, this book is thorough and well organized for text use in courses on nature study, elementary ecology, and field biology. It covers the classification of the plant and animal worlds, the general similarities and differences between plants and animals, the main features of environmental influences on organisms and of adaptation to environment. The various types of animals and plants are treated in detail according to habitat as well as zoological and botanical classifications. There are several useful tables of classification, and, at the end of the book, helpful material on planning field work, preserving specimens, equipment, etc.

★ **Published March 9th. Illustrated with 240 drawings and 39 full-page plates. 726 pages. \$3.60**

MACMILLAN

● RADIO

March 23, 5:15 p.m., E.S.T.

LIFE IN THE LATE STONE AGE—Prof. V. Gordon Childe of the University of Edinburgh.

March 30, 5:15 p.m., E.S.T.

CLOTHES AND THE CHILD—Miss Ruth O'Brien of the U. S. Bureau of Home Economics.

In the Science Service series of radio discussions led by Watson Davis, Director, over the Columbia Broadcasting System.

•First Glances at New Books

History of Science

PRELUDE TO CHEMISTRY—John Read—*Macmillan*, 328 p., illus., 63 pl., \$5. Whoever is interested in the history of science, or in the study of modern chemistry, must surely read this book: it is definitely a "required subject." It tells the long story of alchemy, the forebear of chemistry. Its author, professor of chemistry in the University of St. Andrews, has that happy faculty often found among his countrymen, of presenting the fruits of ripe scholarship in a most fascinatingly readable style—and then modestly pretending that it's all very trifling. The halftone plates and the many text figures are fully worthy of the literary content.

Science News Letter, March 20, 1937

Physics

PROPERTIES OF MATTER—F. C. Champion and N. Davy—*Prentice-Hall*, 296 p., \$4.50. British text and reference book for students of physics and physical chemistry. Detailed and complete with good descriptions of the major experiments by which the properties of matter are determined.

Science News Letter, March 20, 1937

Television

TELEVISION OPTICS, AN INTRODUCTION—L. M. Myers—*Pitman*, 338 p., illus., \$8.50. A British television research worker describes those basic principles by which television turns a scene into electricity, sends it over the air by radiation and reconverts it back into visible images.

Science News Letter, March 20, 1937

Vocations

VOCATIONAL GUIDANCE THROUGHOUT THE WORLD, A COMPARATIVE SURVEY—Franklin J. Keller and Morris S. Viteles—*Norton*, 575 p., illus., \$4. An important book, and one that will interest many outside that group of vocational counselors and advisers of youth for whom this comprehensive study will be of greatest value.

Science News Letter, March 20, 1937

Biology

BIOLOGY: A STUDY OF THE PRINCIPLES OF LIFE FOR THE COLLEGE STUDENT—U. A. Hauber and M. Ellen O'Hanlon—*Crofts*, 559 p., illus., \$3.90. A new textbook in general biology for colleges, and a most unusual one. The authors (and particularly Dr. Hauber, who is responsible for the zoological

chapters) are not content merely to present facts for the students to learn; they do their best to provoke the students to think. Yet the philosophical ideas are presented in such simple, straightforward fashion, salted with colloquial phrases and homely metaphor, that the student is lured into thought without realizing that he is thinking.

Science News Letter, March 20, 1937

Photography

PHOTOGRAPHY—C. E. Kenneth Mees—*Macmillan*, 227 p., illus., \$3. Dr. Mees, who is probably the nation's best authority on photographic science, here brings together in written form his Christmas lectures at the Royal Institution in London. This implies, as it is almost needless to say, that they are presented in non-technical language. The history, the art and the science of photography are most pleasingly present in a volume which every photographer, amateur or professional, will wish to add to his library.

Science News Letter, March 20, 1937

Agronomy

ENGINEERING PROPERTIES OF SOIL—C. A. Hogentogler and others; Ed. by C. A. Hogentogler, Jr.—*McGraw-Hill*, 434 p., illus., \$5. A book for the advanced student and the working engineer, devoted particularly to problems confronted in road construction, the placing of heavy buildings, and all other operations that involve the movement or modification of soil and loading it with burdens.

Science News Letter, March 20, 1937

Physics

ELEMENTS OF ELECTRICITY, A PRACTICAL DISCUSSION OF THE FUNDAMENTAL LAWS AND PHENOMENA OF ELECTRICITY AND THEIR PRACTICAL APPLICATIONS IN THE BUSINESS AND INDUSTRIAL WORLD—William Esty, Robert Andrews Millikan, Wynne L. McDougal—*American Technical Soc.*, 248 p., illus., \$2. Emphasis on the practical aspects of electricity marks this new revision of a popular book which has found wide use in trade schools of the modern education system.

Science News Letter, March 20, 1937

Biology

HISTOIRE D'UN COQ, SA CINÉTIQUE SEXUELLE—Véra Dantchakoff—*Hermann & Cie, Paris*, 41 p., illus., 12 fr.

Science News Letter, March 20, 1937

Physics

THE WORLD IN MODERN SCIENCE, MATTER AND QUANTA—Leopold Infeld—*Victor Gollancz Ltd., London*, 287 p., 5s. Readers of popular books on science in England and America, will not be as familiar with the name of Infeld as they are with the Jeans and Eddingtons of the present day, but here is a book which has the same flair for analogy that marks the writing of these better known scientist-authors. Dr. Infeld is a theoretical physicist at Lwów University in Poland who is now at the Institute for Advanced Study at Princeton with the master Einstein. Prof. Einstein, in fact, writes a praising foreword to the book which truly says "the intelligent layman can obtain from this book a profound insight into the problems of modern physics, and anyone who is anxious to acquire knowledge will find the theme of this book no less dramatic than an exciting novel."

Science News Letter, March 20, 1937

Biography

TRAVEL AND SCIENTIFIC COLLECTIONS OF THOMAS NUTTALL—Francis W. Pennell—*Phila. Botanical Club*, 51 p., 5 pl., \$1. Published as No. 18 of *Bartonia*. Obtainable by ordering directly from the Philadelphia Botanical Club. (See p. 185.)

Science News Letter, March 20, 1937

Engineering

DIESEL ENGINES—P. E. Biggar—*Macmillan*, 165 p., \$3.25. A Canadian consulting engineer reviews the history and operation of Diesel engines in a book which beginners in the field will need. A boom in American Diesel development in the transportation field is predicted because of the recent lowering of train fares to two cents a mile. Buses must meet this competition and Diesel engines are one way out.

Science News Letter, March 20, 1937

Medicine

THE TRUTH ABOUT BRIGHT'S DISEASE—William R. Ohler—*Harvard*, 80 p., \$1. A diagram and a description of the kidneys and their function leads up to an explanation of Bright's Disease, description of the different forms of this condition, symptoms, diet, treatment and as much as is known about prevention. The book is non-technical, concise and informative.

Science News Letter, March 20, 1937